

WHAT IS CLAIMED IS:

1. A signal processing apparatus for interpolating an output color signal from an image sensing device, comprising:

first interpolating device that performs

5 interpolation in a pixel position as an object of interpolation on the basis of pixel data in first and second directions;

second interpolating device that performs

10 interpolation in a pixel position as an object of interpolation on the basis of pixel data in the first direction;

third interpolating device that performs

15 interpolation in a pixel position as an object of interpolation on the basis of pixel data in the second direction;

determining device that determines correlations in the first and second directions with respect to a signal at a pixel position as an object of interpolation;

20 selecting device that selects interpolated data based on an output from one of said second and third interpolating device, on the basis of the determination result from said determining device; and

25 output device that outputs an interpolated signal on the basis of interpolated data, which is based on an output from said first interpolating device, and the output interpolated data from said selecting device.

2. The apparatus according to claim 1, wherein on the

204020-9502900T  
basis of the determination result from said determining  
device, said output device outputs an interpolated signal  
by weighting the interpolated data based on the output from  
said first interpolating device and the output interpolated  
5 data from said selecting device.

3. The apparatus according to claim 2, wherein if said  
determining device is expected to determine that the  
correlations in the first and second directions would become  
equal, said output device generates an interpolated signal  
10 by performing weighting such that the interpolated data based  
on the output from said first interpolating device is  
weighted more than the output interpolated data from said  
selecting device.

4. The apparatus according to claim 1, wherein said second  
15 interpolating device performs interpolation on the basis of  
pixel data, in the first direction, over a broader range than  
that when said first interpolating device performs  
interpolation.

5. The apparatus according to claim 1, wherein said third  
20 interpolating device performs interpolation on the basis of  
pixel data, in the second direction, over a broader range  
than that when said first interpolating device performs  
interpolation.

6. The apparatus according to claim 1, wherein said  
25 selecting device selects one of a difference between the  
output interpolated data from said second interpolating  
device and the output interpolated data from said first

interpolating device, and a difference between the output interpolated data from said third interpolating device and the output interpolated data from said first interpolating device.

5 7. The apparatus according to claim 6, wherein if said determining device determines that a pixel position as an object of interpolation has a higher correlation in the second direction than in the first direction, said selecting device selects a difference between the output interpolated data from said second interpolating device and the output interpolated data from said first interpolating device.

10 8. The apparatus according to claim 6, wherein if said determining device determines that a pixel position as an object of interpolation has a higher correlation in the first direction than in the second direction, said selecting device selects a difference between the output interpolated data from said third interpolating device and the output interpolated data from said first interpolating device.

15 9. The apparatus according to claim 1, further comprising emphasizing means for emphasizing the output interpolated signal from said output device in accordance with the determination result from said determining device.

20 10. The apparatus according to claim 9, wherein said emphasizing device emphasizes one of the first and second directions.

25 11. The apparatus according to claim 1, wherein said second and third interpolating device are HPFs (High Pass Filters).

12. The apparatus according to claim 1, wherein said image sensing device has color filters having a Bayer arrangement.

13. The apparatus according to claim 1, wherein in said image sensing device, pixels are offset.

5 14. A signal processing method of interpolating an output color signal from an image sensing device, comprising:

the first interpolation step of performing interpolation in a pixel position as an object of interpolation on the basis of pixel data in first and second  
10 directions;

the second interpolation step of performing interpolation in a pixel position as an object of interpolation on the basis of pixel data in the first direction;

15 the third interpolation step of performing interpolation in a pixel position as an object of interpolation on the basis of pixel data in the second direction;

the selection step of determining correlations in the  
20 first and second directions with respect to a signal at a pixel position as an object of interpolation and, on the basis of the determination result, selecting interpolated data based on an output from one of the second and third interpolation steps; and

25 the output step of outputting an interpolated signal on the basis of interpolated data, which is based on an output from the first interpolation step, and the output

interpolated data from the selection step.

15. The method according to claim 14, wherein on the basis of the determination result of the correlations in the first and second directions with respect to the signal at the pixel position as an object of interpolation, the output step comprises outputting an interpolated signal by weighting the interpolated data based on the output from the first interpolation step and the output interpolated data from the selection step.

16. The method according to claim 15, wherein if it is expected to be determined that the correlations in the first and second directions would become equal, the output step comprises generating an interpolated signal by performing weighting such that the interpolated data based on the output from the first interpolation step is weighted more than the output interpolated data from the selection step.

17. The method according to claim 14, wherein the second interpolation step comprises performing interpolation on the basis of pixel data, in the first direction, over a broader range than that when the first interpolation step performs interpolation.

18. The method according to claim 14, wherein the third interpolation step comprises performing interpolation on the basis of pixel data, in the second direction, over a broader range than that when the first interpolation step performs interpolation.

19. The method according to claim 14, further comprising

the emphasizing step of emphasizing the output interpolated signal from the output step in accordance with the determination result of the correlations in the first and second directions with respect to the signal at the pixel position as an object of interpolation.

20. The method according to claim 19, wherein the emphasizing step comprises emphasizing one of the first and second directions.

21. The method according to claim 14, wherein the second and third interpolation steps comprise performing interpolation by using HPFs (High Pass Filters).

22. A storage medium storing an operation process program for interpolating an output color signal from an image sensing device, said operation process program comprising:  
15 the first interpolation step of performing interpolation in a pixel position as an object of interpolation on the basis of pixel data in first and second directions;

the second interpolation step of performing  
20 interpolation in a pixel position as an object of interpolation on the basis of pixel data in the first direction;

the third interpolation step of performing interpolation in a pixel position as an object of  
25 interpolation on the basis of pixel data in the second direction;

the selection step of determining correlations in the

first and second directions with respect to a signal at a pixel position as an object of interpolation and, on the basis of the determination result, selecting interpolated data based on an output from one of the second and third

5 interpolation steps; and

the output step of outputting an interpolated signal on the basis of interpolated data, which is based on an output from the first interpolation step, and the output interpolated data from the selection step.

10 23. The medium according to claim 22, wherein on the basis of the determination result of the correlations in the first and second directions with respect to the signal at the pixel position as an object of interpolation, the output step comprises outputting an interpolated signal by weighting the  
15 interpolated data based on the output from the first interpolation step and the output interpolated data from the selection step.

24. The medium according to claim 23, wherein if it is expected to be determined that the correlations in the first  
20 and second directions would become equal, the output step comprises generating an interpolated signal by performing weighting such that the interpolated data based on the output from the first interpolation step is weighted more than the output interpolated data from the selection step.

25 25. The medium according to claim 22, wherein the second interpolation step comprises performing interpolation on the basis of pixel data, in the first direction, over a broader

range than that when the first interpolation step performs interpolation.

26. The medium according to claim 22, wherein the third interpolation step comprises performing interpolation on the basis of pixel data, in the second direction, over a broader range than that when the first interpolation step performs interpolation.

27. The medium according to claim 22, wherein said operation process program further comprises the emphasizing step of emphasizing the output interpolated signal from the output step in accordance with the determination result of the correlations in the first and second directions with respect to the signal at the pixel position as an object of interpolation.

28. The medium according to claim 27, wherein the emphasizing step comprises emphasizing one of the first and second directions.

29. The medium according to claim 22, wherein the second and third interpolation steps comprise performing interpolation by using HPFs (High Pass Filters).

30. An operation process program for interpolating an output color signal from an image sensing device, comprising:  
the first interpolation step of performing interpolation in a pixel position as an object of interpolation on the basis of pixel data in first and second directions;

the second interpolation step of performing



interpolation in a pixel position as an object of interpolation on the basis of pixel data in the first direction;

the third interpolation step of performing  
5 interpolation in a pixel position as an object of interpolation on the basis of pixel data in the second direction;

the selection step of determining correlations in the first and second directions with respect to a signal at a  
10 pixel position as an object of interpolation and, on the basis of the determination result, selecting interpolated data based on an output from one of the second and third interpolation steps; and

the output step of outputting an interpolated signal  
15 on the basis of interpolated data, which is based on an output from the first interpolation step, and the output interpolated data from the selection step.

31. The program according to claim 30, wherein on the basis of the determination result of the correlations in the first  
20 and second directions with respect to the signal at the pixel position as an object of interpolation, the output step comprises outputting an interpolated signal by weighting the interpolated data based on the output from the first interpolation step and the output interpolated data from the  
25 selection step.

32. The program according to claim 31, wherein if it is expected to be determined that the correlations in the first

and second directions would become equal, the output step comprises generating an interpolated signal by performing weighting such that the interpolated data based on the output from the first interpolation step is weighted more than the  
5 output interpolated data from the selection step.

33. The program according to claim 30, wherein the second interpolation step comprises performing interpolation on the basis of pixel data, in the first direction, over a broader range than that when the first interpolation step performs  
10 interpolation.

34. The program according to claim 30, wherein the third interpolation step comprises performing interpolation on the basis of pixel data, in the second direction, over a broader range than that when the first interpolation step performs  
15 interpolation.

35. The program according to claim 30, further comprising the emphasizing step of emphasizing the output interpolated signal from the output step in accordance with the determination result of the correlations in the first and  
20 second directions with respect to the signal at the pixel position as an object of interpolation.

36. The program according to claim 35, wherein the emphasizing step comprises emphasizing one of the first and second directions.

37. The program according to claim 30, wherein the second and third interpolation steps comprise performing interpolation by using HPFs (High Pass Filters).